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DEER FARMING DEVELOPMENT
IN NGHE AN AND HA TINH PROVINCES

DEVELOPPEMENT DE L'ELEVAGE DE CERFS
EN PROVINCES DE NGHE AN ET HA TINH

Project proposal (2nd. draft)

Proposition de projet (2è version)



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POUR LE DEVELOPPEMENT - DEPARTEMENT D'ELEVAGE
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- the People's Committee of Nghê An Province
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2. PRELIMINARY NOTE

This document is the first draft proposal for a deer farming project to be carried out jointly by the Animal Husbandry Research Institute, CIRAD-EMVT and other partners as well. It only contains a checklist of guidelines roughly written down for the sole purpose of discussion and further additions, improvements and other modifications. Thus, it is not to be considered as a final project's proposal.

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3. GENERAL SITUATION

3.1. Deer farming in Asia

As far as we know, deer farming has started in China at least 2,000 years ago, mainly for velvet production under temperate climate. This long tradition has led today to a deer industry which is said to be over 260,000 deer strong, mainly for velvet antler cropping, the annual production being around 115 tons dry weight (DREW et al., 1989).

In Asia, the farming/ranching of deer is mainly carried out under temperate conditions with temperate species of cervids : the reindeer (*Rangifer tarandus*) in Siberia, the Asiatic wapiti or malu (*Cervus elaphus xanthopygus*) and other subspecies of red deer in China and former USSR, six subspecies of sika deer (*Cervus nippon*) in China (the main one is the Northeastern sika or meihualu (*C.n.hortulorum*)), Korea (*C.n.taiouanus*) and former USSR.

In tropical Asia, traditional deer farming mainly exists in Southern China (Kopsch's deer), Taiwan (Taiwanese sika) and Vietnam (Vietnamese sika), the most tropical being Vietnam. In all cases it concerns the sika deer. New countries are now entering into the deer farming industry with a modern approach.

The principles of modern deer farming have been established only 20 years ago in New Zealand. The latter country is now leading the world deer industry with no less than 1.3 million heads behind fences. As a matter of fact the tropical countries are far behind the temperate ones. It may even be said that the deer farming technology under tropical conditions is not yet fully established.

Regarding commercial aspects in Asia, China mainly self-consumes its velvet production. The same happens in Vietnam. As New Zealand has a tiny local market, the productions are mainly exported : the velvet is principally sold to South Korea while the meat is marketed in Western Europe, Germany being a commodity market, and also in USA, Japan, etc.

3.2. Deer farming in Vietnam

3.2.1. Wildlife farming in Vietnam

- Crocodile farming : two crocodile farms have been set up with the Cuban crocodile (*Crocodylus rhombifer*) (SALTER, 1991).

- Snake farming : there are several snake farms of two kinds, one for antivenine production, the other for meat and medicinal products with python (SALTER, 1991).

- Monkey farming : a single macaques farm is exporting alive animals (SALTER, 1991).

Like in many other countries, wild Birds and Mammals are largely consumed in Vietnam. A specific trait concerns the important traditional consumption of Insects, especially as spices and condiments (HUARD & DURAND, 1954).

Finally, it may be noticed that Vietnam is rich of several wild species of large Mammals which have a promising economic future (POPENOE, 1983) :

- Suids : the wild boar, *Sus scrofa*
- Bovids :
 - * the banteng, *Bos javanicus*
 - * the gaur, *Bos gaurus*
 - * the kouprey, *Bos sauveli* ¹
 - * the serow, *Capricornis sumatrensis*
 - * a newly discovered, still undescribed, Bovid ²

3.2.2. Current situation of deer farming

According to Withehead (1993) five species and seven subspecies of Cervids are native to Vietnam :

- 1°) the Indian Muntjac or Barking deer :
 - 1 species (out of 6 or 7), 3 subspecies (out of 15) :
 - * *Muntiacus muntjak vaginalis* (extreme North)
 - * *M.m.nigripes* (North)
 - * *M.m.annamensis* (South)
- 2°) the Hog deer :
 - 1 subspecies (out of 2) : *Axis porcinus annamaticus*
- 3°) the Vietnam (Tonkin) sika deer :
 - 1 subspecies (out of 13) : *Cervus nippon pseudaxis*
- 4°) the Siamese Eld's deer or Thamin :
 - 1 subspecies (out of 3) : *Cervus eldi siamensis*
- 5°) the Malayan Sambar deer :
 - 1 subspecies (out of 15) : *Cervus unicolor equinus*
- 6°) the Dwarf or Forest Musk deer :
 - 1 species (out of 3) : *Moschus berezovskii*

¹ Discovered in 1937, named after Dr.SAUVEL, former Director of CIRAD-EMVT, France.

² Discovered in 1992 in Vu Quang Nature Reserve (Ha Tinh Province, one of the two Provinces concerned by the present project), still unnamed (IUCN, 1992; WWF, 1992); see annex 2.

The main species farmed in Vietnam belongs to :

* the Sika deer species described as :

Cervus nippon Temminck, 1838

* the Vietnam (Tonkin) Sika subspecies :

- described as : *C.n.pseudaxis* Eydoux and Souleyet, 1841,
- locally called : *Huou sao* (Star deer),
- also called :
 - * Sika
 - * Vietnam Sika
 - * Tonkin Sika
 - * Spotted deer
 - * Pseudaxis
- sometimes considered as a synonym of the South China Sika or Kopsch's deer, *C.n.kopschi*, although "the classification of the Chinese Sika deer is (...) still a little obscure" (Withehead, 1972).

The Sika is locally considered to produce the best velvet (*Nhung*) and the best body extracts (*Tinh*). The velvet of Sika is known as very strong and is only given to men above 40 years old. Very few Sambar deer are also farmed, their velvet is cheap and used for making low quality tonic wax. We are not aware of any other species farmed in the country, apart from zoos.

Small scale deer farming has been carried out by Vietnamese villagers for several hundred years, the main product being antlers in velvet sold to local medical practitioners (HIEP and MO, 1968 in SALTER, 1991). Velvet earns a lot : 1.5 million Đông³/head/year.

As a consequence meat as such is not very much sought after. It is culturally not accepted to slaughter deer. When available, carcasses are processed to make extracts for medicinal purposes.

In 1991, D.Hulse (in SALTER, 1991) estimated the total number of deer in captivity at about 7,000 heads, approximately 5,000 of these in private, the remainder in government farms. In 1992, Dr. LE VIET LY (cf. annex 1) estimated at 10,000 heads the number of deer farmed in the sole Provinces of Nghệ An and Hà Tĩnh (cf. table 2).

Most of the farmed deer belong to small holders who usually keep 1 to 5 heads in pens inside their houses. As the value of alive deer is very high (20 millions Dong/pair), one head is usually owned by several farmers.

³ Approximate rate : 1 US\$ = 10,000 Đông
 1 FF = 2,000 Đông

The animals are kept beside or inside houses. They are stall fed following a 100% cut and carry system. They may be considered as almost tamed.

The main government farm is Huong Son Deer Breeding Farm in Hà Tĩnh province which holds 300 heads in 1992 (LE VIET LY, 1992). The objectives of this farm are first to provide the private farmers with alive stock, second to supply the market with velvet.

There is no specific regulation concerning deer farming in the country. Having no legal status, the farmed deer are supposed to belong to the farmers themselves. At this point it must be emphasized that wildlife depends on Forestry Department while animal husbandry falls under the Agriculture Department (to be confirmed).

3.2.3. Prospects

- Development of deer farming :

In the two Provinces, the number of deer farms is increasing, especially in some districts, like Quynh Luu (Nghê An Province), as shown by the high demand of breeding stock and the expensive price of the animals (LE VIET LY, 1992). For instance, in the commune of Quynh Xuan (Quynh Luu district), there are 3,600 people and already 750 deer (1 deer/4.8 people). Other Provinces without tradition in this field are wanting to start farming deer.

Nevertheless, the development of the deer farming industry is actually slowed down by :

- . reproduction problems : the present herd does not reproduce as well as it should (NGUYEN TAN ANH & GYEN QUYNH ANH, pers.com.) to meet the growing demand from the farmers,
- . financement problems : a large proportion of the small holders dot not have the financial capacity to buy a deer.

- Farmer's motivation :

At farmer's level, the income issued from velvet sell is equivalent to two rice's crops (NGUYEN QUYNH ANH, pers.com.), thus explaining :

- * why the main motivation for deer farming is profit,
- * why the development of the industry is spontaneous and not induced by external strengths.

As a matter of fact all the medicinal preparations using products/by-products of deer are much popular and belong to the deep culture of the populations. There are numerous ways of processing and utilizing these drugs which are mainly regarded as strong tonics. Some are very famous, like the cooked antler jelly (HUARD & DURAND, 1954). The once-a-year seasonal velvetting operation (March) is subject to popular fests. At that time the blood obtained from the velvetting operation is drunk with alcool for making aphrodisiac.

The local demand for these drugs is so high and the market prices so expensive that no exports is planed at this stage. Nevertheless some constraints remain, like some processing problems and some marketing difficulties, which both could be solved by the project.

- Contribution to the economic recovery :

Even though deer farming still remains a marginal activity in comparison with other agricultural production, it is already in a position of playing a major role for the economic development of rural areas by :

- * bringing cash to the farmers, helping them to buy inputs, invest in modern equipment, etc., finally increase their production,
- * allowing farmers to increase their revenue and improve their standard of living,
- * creating a cashflow from urban to rural areas,
- * diversifying the panel of agricultural productions.

4. THE PROJECT

4.1. Justification

The project is regarded as important for a number of reasons :

- Vietnam is the only country in Southeast Asia to have developped a real deer industry for a long time; therefore the country has taken some advance in front of most of the other countries, while :

- * there is a growing interest in the Southeast Asia region for a different and new kind of animal husbandry,
- * there is a recent and world wide development of a wildlife ranching industry, especially deer farming in the Pacific area, in Europe and North America,

- the economic situation in Vietnam is in a favorable condition for the development of deer farming :

- * the deer products belong strongly to the local culture and are already established in the local market,
- * the demand for deer products far exceeds the offer, thus the deer farming industry is more market led than product driven,
- * the national econmy is rapidly recovering with promising prospects in the near future,

- the development of deer farming :

- * will be much facilitated by the already existing technology,

- * will provide a new opportunity for farmers :
 - . for already established farmers looking for a change, or for a diversification of their present production,
 - . for newly established farmers seeking an original profit making animal production,
- * will contribute to reinforce the agricultural sector :
 - . sustaining the diversification of the productions,
 - . contributing to maintain population in rural areas,
 - . creating a cashflow from urban to rural areas.

- presently no research programme is engaged on deer farming in Southeast Asia ; therefore the present project may have a regional importance.

- on the technical side, the local conditions appear very suitable to develop the deer farming industry, given that the major farmed species is native to the region and appears well adapted to the existing farming system.

- as the Vietnam Sika deer is threatened in the wild in its original habitat, the project will contribute to the conservation of biodiversity.

4.2. Objectives

The proposed project has the following objectives :

- First objective : development

The aim of the project is to contribute to the economic development of the region. To reach this aim, the project is expected to help the farmers to :

- . develop their activities and/or initiate new activities,
- . improve the living standards of their families,
- . save, invest and consume as active economic operators in the region,
- . achieve a sustainable development respecting the environment through the wise use of natural resources.

- Second objective : education

The technology will have to be transferred from the project to farmers, students and officers as far as possible and eventually to foreign scientists and institutions in the framework of regional cooperation. Environmental aspects will also be included in the education programme : sustainable utilization of natural resources, conservation of biodiversity, etc.

- Third objective : research

Some research is already needed to help this poorly-known activity. It is the duty of the project to seek answers to the technical questions asked by the farmers. Applied research will go along the development work, always keeping in mind to find practical solutions to the priority problems.

4.3. Organization

4.3.1. Structure

The following structure is proposed as a suggestion :

- Head of the project :

The project may be headed by a so-called "Deer Farming Committee" comprising one representative of each of the followings :

- * the Province (Committee of Science and technology of Nghe An Province),
- * the Quynh Luu District,
- * the Animal Husbandry Research Institute,
- * the Association of the Deer Farmers,
- * CIRAD-EMVT.

The Deer Farming Committee will act as an administrative, financial, technical and scientific board which will :

- * be responsible of the project for legal, administrative, financial, technical and scientific issues,
- * determine annually :
 - . the objectives of the project,
 - . the means (financial and human) to reach these objectives,
- * meet every 4 months,
- * nominate one of the scientist involved in the project for the position of Project Manager,
- * keep in touch with the Manager on a regular basis.

The Deer Farming Committee will work also collaborate with the National veterinary Institute.

- Project management :

The project will be managed by a "Project Manager" chosen by the Deer Farming Committee. The Manager will have to be a scientist with specific knowledge on deer farming and with some experience in the management of rural development project.

The Manager will be :

- * in charge of :
 - . the implementation of the project,
 - . the daily management of the project,
- * based in the center of the project's area and will stay as close as possible to the field work and the staff.

- Field work :

The very nature of the project is to work in the field, e.g. in the farms with the deer farmers themselves. This work will be done by Animal Husbandry Auxiliaries, so-called "Extensionists", under close supervision of the Manager. The Extensionists will be technicians in general animal husbandry. They will first be selected after passing an appropriate practical and theoretical exam organized by the Project. They will then be trained in deer husbandry by the Project.

Each Extensionist will be :

- * in charge of :
 - . all the deer farmers in a given area,
 - . the extension's tasks formerly defined by the Deer Farming Committee and the Manager,
- * based in the center of his working area.

The entire team of Extensionists will be assigned to work with the small holders.

- Huong Son Deer Breeding farm :

Having its own staff and budget, the Huong Son Deer Breeding farm will not absorb the human and financial resources of the project. Nevertheless a collaboration agreement may be studied where :

- * the farm will benefit technical advises from the project,
- * the farm will provide support for research programmes and education/training activities.

- Foreign expertise :

It is proposed that a deer expert assist the implementation of the project on a permanent basis during the first 2 years of the 3 year project. The expert will have to be experienced in :

- * deer farming in tropical conditions,
- * field work with deer,
- * technical and scientific know-how regarding deer farming,
- * organisation of the whole deer industry from upstream to downstream,
- * implementation and management of development projects,
- * extension, education and research in deer farming.

CIRAD-EMVT is prepared to assign a member of its deer experts team to this project.

4.3.2. Programme

The two main topics of the programme (Table 1) are :

1°) to improve the technical and economical productivity of the individual farms by :

- extension of well defined technical themes,
- search of improved methods of production,

2°) to improve the technical and economical efficiency of the whole deer industry by :

- advises to the farmers in order to better organize and structure their industry,
- search of improved methods of processing and marketing.

Table 1 : Programme

Aims	Methods	Tasks
To improve the production of the deer farms	Defining suitable technical themes	Selection of the themes by the whole project team
	Extension of the technical themes	Visits to the farmers by the Extensionsits
	Same for health protection	Same for health protection
	Improvement of the technical themes	Feedback in technical project meeting
To improve the efficiency of the whole deer industry	Improvement of the organisation of deer producers	Advising the farmers to improve the efficiency of their association
	Structuring the deer industry	Advising the farmers to better structure the deer industry
	Organisation of input flows	Advising farmers to have better access to material, drugs, food...
	Organisation of ouput flows	Advising farmers to better market their productions

4.3.3. Implementation

The deer farms are located in the Provinces of Nghe An and Ha Tinh. Nevertheless the project will concentrate on the Nghe An Province and especially the Quynh Luu District. The project may also provide some technical advises (but no financial resources nor permanent staff) to the Huong Son Deer Breeding farm in Ha Tinh Province.

According to the figures (Table 2) given by LE VIET LY (1992), there are 10,000 deer farmed. If the theoretical assumption of 2 deer per farm in average is taken, the number of farms would be 5,000.

To carry out the programme, the team of Extensionists will pay regular visits to the deer farmers for 5 days a week, 48 weeks a year (Table 3). The 6th. day a project meeting will be held for half a day to gather the project team for exchange of informations, training sessions and other matters as well.

Table 2 : Current number of deer (herd) farmed in Hà Tĩnh and Nghệ An Provinces (LE VIET LY, 1992; see annex 1).

COMMUNES		DISTRICTS		PROVINCES		TOTAL HERD
NAME	HERD	NAME	HERD	NAME	HERD	
Tay Son	300					
Son Giang)						
Son Trung)	4,000	Huong Son	4,300			
Son Chan)						
Son Ninh)						
				Hà Tĩnh		
				Huong Khê		
				Duc Tho		
						10,000
Quynh Xuan	750					
Quynh Bang	600-650					
Quynh Luong	500					
Quynh Tien	450	Quynh Luu				
Quynh My	300-450					
Quynh Lien	300-450					
Quynh Van	300-450					
18 others	<300/c.					
				Vinh City	+/-200	
				Nam Dân	+/-200	
				Diên Châu	+/-200	
				Yên Thành	+/-200	
				Quy Hop	100-200	
				Dô Luong	100-200	
				Nghĩa Dân	100-200	
				Tân Ki	100-200	
				Thanh Chuong and others	50-70/d.	

For a number of reasons (remoteness, isolation, etc.), it is assumed that 3/4 of the farms could be surveyed. To carry out this task, the number of Extensionists needed is estimated in the tables 3 and 4 :

- 300 farms could be followed by each Extensionist,
- in this case 12 Extensionists will be necessary.

One must also take into account :

- the distances to cover in some cases (in some districts the number of deer is small),
- for one reason or another some Extensionists are not available during short periods of time.

For the reasons given above, 3 more Extensionists are supposed to be needed. Therefore the total number is 15.

Table 3 : Number of deer farms to be surveyed per Extensionist.

Time employment for one Extensionist	Number of deer farms surveyed per Extensionist
Day:	
8 hours work	
1 hour visit/deer farm	
1/2 hour transport between 2 farms	
2 x 1/2 hour for home transport	5 farms/day
Week:	
5 days visit/week	
1/2 day meeting with the Manager/week	25 farms/week
Year:	
1 visit/farm/3 months (or 4 visits/year/farm)	
52 weeks - 4 weeks off = 48 weeks/year	
48 weeks x 25 farms/week : 4 visits/year/farm	300 farms/year

Table 4 : Evaluation of the number of Extensionists which is needed to survey the deer farms of the project area.

Number of deer farms = 10,000 deer : 2 deer/farm = 5,000 farms

Number of deer farms
which could be surveyed
(assumption : 3/4) = 5,000 farms x 0.75 = 3,750 farms

Number of Extensionists = 3,750 farms : 300 farms/Extensionist
= 12 Extensionists.

4.4. Time schedule

The first phase of the project will be carried out in 3 years (Table 5). A second phase may be proposed and discussed during the first one.

Table 5 : Time schedule.

THEMES	YEAR	1	2	3
<hr/>				
DEVELOPMENT				
- preparation work :		xxxxxxx		
farms survey, identification				
of constraints, definition of				
working areas/Extensionist				
and extension themes				
- extension work			xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	
- industry organisation			xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	
EUCATION				
- preparation work :		xxxxxxx		
training of Extensionists				
- training of farmers			xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	
- training of students, others				xxxxxxxxxx
RESEARCH				
- preparation work :				
selection of the topics		xxxxxxx		
- applied research			xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx	
- conclusions and regional				xxxxxx
workshop				

5. TECHNICAL ASPECTS

5.1. The deer

Unlike many countries where the deer species to farm has to be carefully selected, Vietnam has no such choice to make. There seems to be no doubt about it in the mind of the farmers as well as of the officers and scientists. In Vietnam the Sika deer is widely recognized as the best deer to farm for two main reasons:

- it is said to be the best velvet producer, in terms of quality; although the Sambar deer produces a much larger amount of velvet per animal, its velvet is considered as poorly valued,
- it is a native species and, as such :
 - * is well known and readily accepted by local people,
 - * is regarded as part of the local culture,
 - * is supposed to be well adapted to local conditions,
 - * does not present high ecological risk in case of escaping (CHARDONNET, 1991).
- it fits the right criteria for farming :
 - * gregarious : used to live naturally in large herds,
 - * polygamous : one male for many females,
 - * quite easy to handle, not too aggressive,
 - * quite easy to feed on a large scale : mixed diet,
 - * good producer : good quality velvet.

Among the 13 subspecies of sika deer existing in Asia from temperate to tropical latitudes, the Vietnamese is the most tropical and the only true tropical one. Many Sika have been introduced in exotic countries around the world in :

- open environments (several States in USA, Ukraine, Ireland, Scotland, England (REDER, 1990), etc.) ; some of these introductions have led to ecological problems like uncontrolled hybridization between Sika and Red deer (New Zealand, Great Britain, etc.),
- fenced areas like Rambouillet in France, Germany, Denmark, several Eastern Europe countries and Morocco.

The choice of the Sika deer is not to be discussed. Nevertheless in some instances, other deer species may complement -not replace- the Sika deer as diversification options :

- according to various experiments in other similar countries (Malaysia, Brazil, New Caledonia, etc.), the temperate deer species (Red deer, *Cervus elaphus*, or Fallow deer, *Dama dama*, etc.) should not be considered because they are not adapted to tropical environments ;
- other tropical species of deer would be suitable for farming:
 - * the Timorensis deer or Rusa deer, *Cervus timorensis* :
 - . originally from Indonesia, middle size deer (similar to sika deer or slightly larger), very gregarious and

polygynous, intermediate feeder, easy to handle,
 . the breeding technology is certainly better known for
 this species than for any other tropical species,
 . it is the most gregarious of the tropical deer and,
 thus, can stand to live in very large herds,
 . it is readily available in large number for sale
 overseas,

* the Sambar deer :

. originally from tropical Asia with a subspecies native
 to Vietnam, large size deer, moderately gregarious,
 intermediate feeder/browser, not so easy to handle,
 . the breeding technology is not yet well established,
 . it is the largest tropical deer,
 . it may be found in the country in small numbers,

* the Axis deer, *Axis axis* :

. originally from India, middle size deer (similar to
 sika deer), very gregarious and polygynous,
 intermediate feeder/grazer, not so easy to handle,
 . the breeding technology is not yet well established,
 . it may be found for sale overseas in quite large
 numbers,

* the Hog deer :

. originally from part of tropical Asia with a
 subspecies native to Vietnam, small size deer (smaller
 than Sika deer), little gregarious, intermediate
 feeder,
 . the breeding technology is not yet well established,
 . it may be difficult to find locally but may be found
 for sale overseas in small numbers.

5.2. Reproduction and selection

The current reproduction system may be defined as a controlled,
 single-sire and natural mating :

- controlled mating : the farmer knows precisely when the stags
 will mate the hinds because he separates the sexes outside the
 appropriate time,

- single-sire mating : the farmer knows precisely which stag is
 the parent of each fawn because he chooses the stag to mate a
 hind,

- natural mating : no artificial reproduction for the time being.

This reproduction system may be assessed as :

- already sophisticated enough to :

* survey carefully the reproduction parameters of the herd,
 or at least a sample of the herd ; the very small number of
 animals per farmer allows easy life history recording for
 each head ; also, an individual identification system can

easily be set up for individual data recording,
 * implement a selection scheme (see below),

- not performant enough : according to all the people interviewed (farmers, veterinarians, officers, researchers, etc.), the main technical constraint to deer farming is presently the poor reproduction performances ; the low recruitment rate of the herd has important economic consequences :

* at farmer's level : low offspring sales,

* at industry's level : slow development of deer farming.

According to NGUYEN TAN ANH, NGUYEN QUYNH ANH and others (pers.com.), 15% of the Sika hinds in Vietnam would be "sterile". A similar reproduction problem in Sika deer farms has been described in former USSR (Drew et al., 1989). In China, Sika deer farms get a calving rate of 85-90% (surviving fawns/hinds mated) (DREW et al., 1989). PINNEY (1981, In DREW, 1985) reports a sika deer farm with 5-8% twinning rate. In a single Sika deer farm in Penang Island (Malaysia), twins are not rare and a triplet has been observed (CHOY, pers.com.).

To solve the problem, the following approach is recommended :

- phase 1 : study of the problems through :

* an ecological pathology inquiry (study of relationships between disease and environment):

- . survey of the farms to assess precisely the reproduction parameters in different conditions,
- . establish statistical correlations with farm and animal factors (risk factors),

* a fertility inquiry :

- . physiology survey,
- . sanitary survey.

- phase 2 : identification of solutions by :

* looking for appropriate technical answers to the above identified interrogations,

* testing these technical solutions ; if they appear suitable, they become technical themes for the extension programme.

- phase 3 : implementation of the technical themes by :

- * extension at farmer's level,
- * evaluation of the results.

For instance (a, b, c) :

a. The inquiry may show that the housing facilities have a negative impact on the hind fertility. The lack of light in stables may be responsible of a weak cyclicity of the hinds and a late first mating of the young hinds. It could appear that opening windows in stables, and/or releasing the hinds for a while into an open yard, would help to cycle the hinds and improve the fertility. Such simple measures could represent one

of the technical themes for the Extensionists to develop.

b. By using a well established pregnancy testing method (adaptation of the Ultrasonic method already known for Red deer, Fallow deer, Rusa deer, etc.), the Extensionists would be able:

- to identify the non-pregnant hinds at an early stage,
- to improve the knowledge of the factors responsible of poor reproduction success.

c. A rational breeding scheme will allow more exchanges of breeding stags from farm to farm, thus reducing the probable high inbreeding level in the herds where it is difficult to move the males.

Improving the performances may also be achieved by selection. Two steps may be followed :

- Knowledge of genetics :

The genetic status of the deer herd has to be studied in order to be more efficient in terms of selection improvement. All the deer farmed now come from a few heads captured long time ago in the wild. It is thus possible that, in its history, the population has undergone a bottleneck with the current consequence of a low genetic variability. This supposed low genetic variability may be emphasized by an important inbreeding due to few exchanges of males from farm to farm.

- Selection scheme :

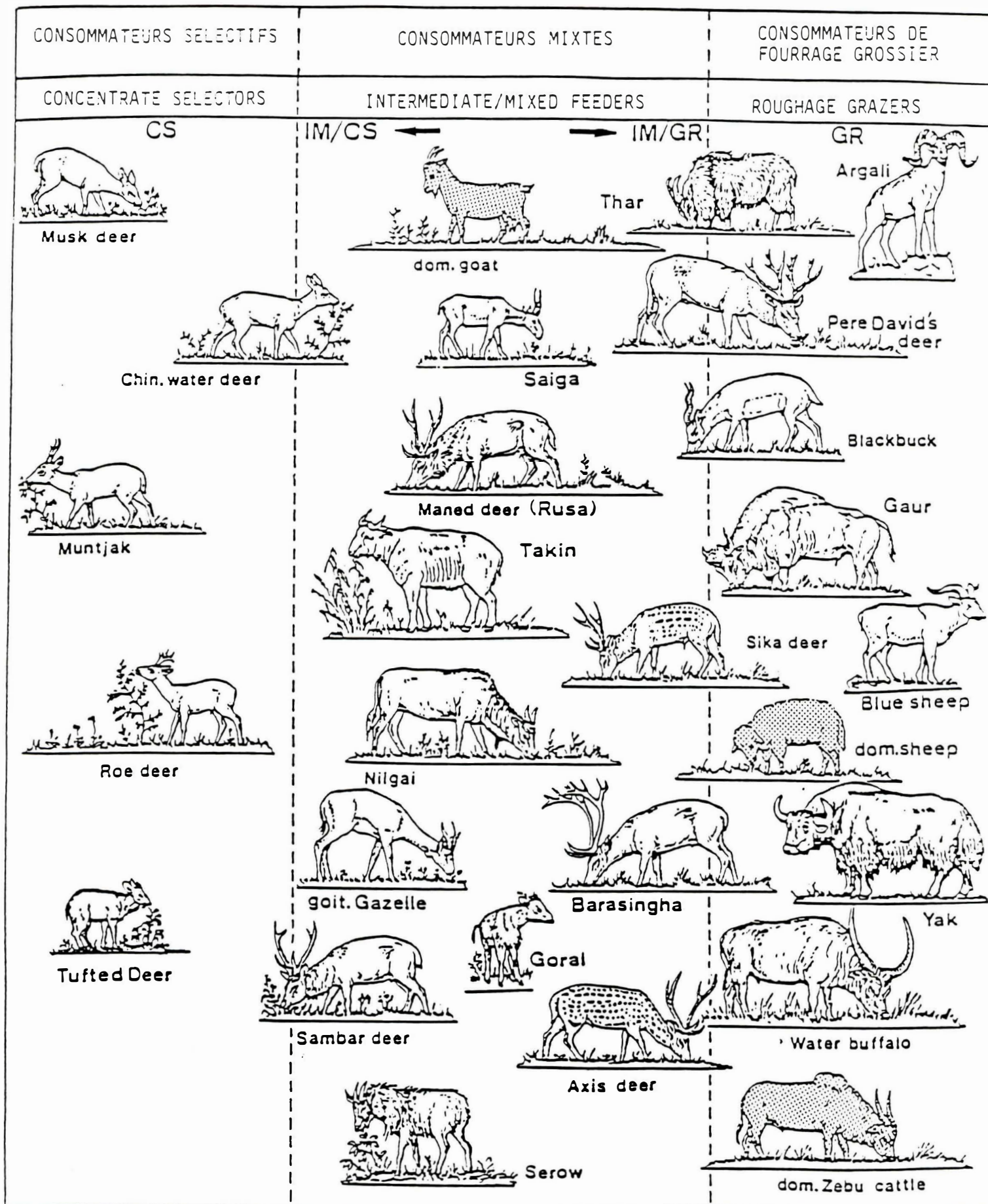
A selection scheme has to be carefully studied : which method (individual selection, parental selection, progeny testing, etc.), which selection criteria given its priority, heritability, correlation with other features, etc. (velvet weight, velvet quality, carcass and growth parameters, behavior -tame-ness-, reproduction performances, disease resistances, etc.), which selection pressure (size of the herd under selection, number of selected breeders, length of their breeding life, etc.), etc. It is essential for good results that the farmers understand the scheme and agree with it, so they are fully responsible and participative.

5.3. Feeding

The sika deer is classified as "intermediate or mixed feeder" in the Hofmann's classification of the ruminants diets (HOFMANN, 1984) : the species is opportunistic, being both grazer or roughage eater and browser or concentrate selector (HOFFMANN, 1984). Previous studies have shown that :

- in Manchuria wild Sika feed on 129 plants with 70% browse,
- in European states of former USSR farmed and wild Sika feed on more than 390 plants with more browse in winter than in summer.

FIGURE 1 : HOFMANN's classification of Ruminants (HOFMANN, 1991)



In Vietnam the feeding system is :

- a feedlot scheme, the deer being fed entirely by the farmer, with no direct grazing at all,

- based on a mixture of feeding components :

- * staple diet :

- given to all the animals,

- made of :

- . green leaves, with special importance given to melia tree⁴ *Melia azedarach* or (?) *Azadirachta indica* and jackfruit leaves, *Artocarpus heterophyllus* (nangka),

- . green grasses, especially paragrass (*Brachyaria mutica*) and elephant grass (*Pennisetum purpureum*),

- . dry leaves stocked,

- * supplementary diet :

- given to :

- . the stags at the stage of growing antlers (December, January),

- . the hinds before fawning time (December, January),

- made of :

- . agricultural by-products like banana trunks, rice bran, peanuts straw, maize husk and stem, etc.

- . minerals.

There is considerable local knowledge related to the plants accepted by the deer. This knowledge merits to be written down and improved by nutritional analysis. The food intake should also be studied to adjust the ration to the physiological stages according to the sex. Both nutritional analysis and food intake study will allow researchers to design appropriate diets matching the needs (energy, nitrogen, minerals) with the food sources available. Recommendations will be given to the Extensionists to advise the farmers.

Very few scientific research has been carried out with sika deer. The informations available in sika feeding are especially rare (Table 6). Much improvement is expected by the project in this field. For instance, it is assumed that (a, b, c) :

a. For the stags : it has been shown with the Red deer that supplementary feeding must be given :

- just before the rut because the intake drops dramatically during the rutting period,

- just after the rut because the stags are very weak due to their major loss of weight,

- before (and not only after) the antlers (buttons) casting

⁴ poisonous for domestic animals

for a good velvet growth.

b. For the hinds : it has been shown with other species of deer that supplementary feeding must be given just after (and not before) fawning, because their intake and nutritional needs nearly double at that time due to the start up of the lactation.

c. For the food sources : many already existing agricultural by-products, cultivated grasses and planted shrubs and trees may be utilized to improve the feeding of deer (CHARDONNET, 1988). Some food conservation systems may also be introduced like urea treated rice straw or silage of gliricidia leaves.

Table 6 : Examples of sika rations in Korea and former USSR sika deer farms (DREW et al., 1989).

	Daily intake (kg DM/day)	Concentrate Quantity (% ration)	Nature
Korea	1.8 kg	90 %	dairy ration barley bran
Former USSR (winter)	2 kg	50 %	grain, acorn

Nota : The Sika deer subspecies concerned (*C.n.hortulorum* & *C.n.mantchuricus*) are different from the Vietnamese one :
 . they are larger,
 . they have higher nutritional needs (movement due to direct grazing; cold weather)

5.4. Health

The sanitary aspects of deer farming in Vietnam are not known even though there is some traditional know how (LE VIET LY, pers.com.). The following pathological disorders are already considered in Vietnam as important problems :

- reproduction pathology :

* late sexual maturity : the majority of the hinds are mated between 12 and 19 months old, very few (1%?) are mated before 1 year old (born in January, mated in October), rarely but possibly at 7 months old. The early mated hinds may get dystocia and/or give birth to weak fawns.

* "sterility" : some hinds seem to be non-cycled, some stay in heat for too long and do not get pregnant after several

matings, some appear to be in heat but refuse the stag, some are repeat-breeders, some are receptive to the stag even during their pregnancy, etc. Thus there is a number of different cases and the physiological factors must be distinguished from the pathological ones.

* abortion : in some districts some abortion cases are reported.

- digestive tract pathology :

* diarrhea is said to be often observed, sometimes with parasites, sometimes with "inflammation of the stomachs and intestins" noticed at post mortem examination.

* in some instances the latter cases are associated with inflammation of the eyes, suggesting Malignant Catarrhal Fever (MCF), a frequently fatal disease for sika deer in several countries (in USA: SANFORD et al., 1977 ; HEUSCHELE et al., 1985 ; in Canada: FRITZ et al., 1992 ; in New Zealand: WILSON et al., 1983).

* Malnutrition is also said to lead to death.

- respiratory pathology :

"Inflammation of the lungs" is said to be quite frequent, especially due to cold weather before 3 months of age.

- parasites :

Dr. PHAM SY LANG (Department of Parasitology, National Institute of veterinary Research) has already observed the following parasites in deer (pers.com.) :

- . liver fluke, *Fasciola hepatica*,
- . paramphistomiasis, *Paramphistomum cervi*,
- . trypanosomiasis, *Trypanosoma evansi*,
- . demodectic mange, *Demodex folliculorum* var. *cervi* (PHAM SY LANG, 1981),

Some important diseases may also affect the farmed deer and should be looked after, especially :

- viral diseases :

- * MCF (see above),
- * Epizootic haemorrhagic disease of deer,

- bacterial diseases :

- * bovine tuberculosis,
- * haemorrhagic septicaemia,
- * melioïdosis,

- parasitic infestation :

- * lung worm, *Dictyocaulus viviparus*,

Presently, traditional treatments are of much use. For instance:

- the leaves of the filao tree, *Casuarina sp.*, are utilised as a drug to treat diarrhea,
- the leaves of the melia tree, are usually given to the deer as anthelmintic.

These treatments are of much interest and should be studied carefully. However there are some gaps in this traditional medicine. They may be filled by the research works of the project.

Until now, in Vietnam, very few research works have been conducted in deer science (DAO TRONG DAT, pers.com.). The National Institute of veterinary Medicine, Hanoi, has worked on some aspects of the parasitology of deer. There is much demand for scientific help coming from the farmers and the veterinarians in the field. The health problems remain a major constraint.

5.5. Productions

No information on global productions was available at the time of the project identification. There are three main kinds of production : velvet, alive animals and body extracts.

* Velvet :

The antlers at the velvet stage (growing antlers or "velvet") represent the main product of the farm. All the males are kept for velvet production. The average production of the adult sika deer is 0.8-1 kg/head/year for a producer price of 1.5-2 million Đông/kg (150-200 US\$). The income from the once a year crop of a single stag represents a major source of cash for the farmer(s) involved.

Although much traditional know how in velvet production already exists, the quality of the velvet is said to need some research and improvement. The Sambar deer produces 2 to 3 times more but at a very much lower selling price.

The majority of the production is sold locally. Some is exported to China, some is selfconsumed. The demand of the local market is far to be covered. The demand from export is also very much left unsatisfied : for instance, 2 tons of velvet were ordered for export in 1992 by a dealer of Hô Chi Minh and remained without answer. There is not much organization in the marketing of velvet.

* Live animals :

Only the young hinds are usually sold. Sometimes a pair is sold. It is a very high price production : the producer price is 20 millions Đông/pair (male+female) (2,000 US\$). Actually the main source of alive deer is the Huong Son breeding farm but the

production is much too low. Better reproduction performances at the small holder's level would improve dramatically the revenue of the revenue of the farm.

* Body extract :

As no deer is slaughtered for meat as such, only very sick or old animals are processed for making body extracts.

* Meat or venison :

Other species of deer than Sika could eventually be bred for meat production. Rusa deer would be very suitable. Sambar or Hog deer would also do. The large cities market could be looked after. The export markets are probably interesting, especially due to the low production costs in Vietnam.

5.6. Farming system

- Deer ownership :

More than 90% of the deer herd belong to the private sector. The majority of these farmers are small holders, owning a small piece of land (mainly rice fields) and 1 to 3 heads of deer. The deer farmers owning 4 to 6 heads of deer (which anyway remains a very small number of animals) are considered as big farmers.

Many of the small holders do not own the deer by themselves ; in most cases one deer belongs to two to five farmers because of its very high price compared to the average cash income per farmer. A joint venture gives the keeping and management of the deer to one of the owners.

The deer is considered as a good investment : many people buy a deer with cash earned with other activities like mines, forest exploitation, etc. However, the lack of finances is regarded as a major constraint to the development of the industry (TRAN VAN DANH, pers.com.).

- Specialisation in deer farming :

The farmers in charge of keeping deer have developed an already extensive experience in this field, especially the ones belonging to families who have been farming deer for long time. Some of them are city dwellers. Although all the farmers are mixt farmers (they have several activities), keeping deer is now a job in itself.

Meanwhile, some new jobs have been created : building deer stables, cropping roughage and leaves as food for deer, specialized veterinarians, etc.

Nevertheless, there is a need of specialized knowledge. Farmers, officers, veterinarians, etc. are very keen to get technical and scientific informations to improve deer husbandry. The lack of

expertise is considered as another constraint to the development of the industry.

- Husbandry :

The method utilized in Vietnam for farming deer may be described as such :

- * housing : the animals are kept in small stables (3-6 m²), the males often alone, the females often together,
- * feedlot : the animals are entirely fed by the farmer,
- * very intensive,
- * using fully domesticated animals; anyway, escaped deer are said to return to the wild.

There are few exceptions to the above described husbandry method, the main one being Huong Son deer breeding farm where deer are kept in open air paddocks.

5.7. Industry organization

There is already a "Deer Producers' Association (DPA)". The project will have to :

- * work closely with the organization,
- * help the organization to improve its efficiency and to involve the deer farmers as much as possible,
- * transmit its experience to the organization in any field of management, technology, science and education,
- * transfer its goods and assets to the organization at the end of the whole programme (after the last phase in case of further steps).

It is intended to help the DPA to :

- * set up a cooperative store with all the necessary inputs for an improved deer husbandry (veterinary drugs, seeds of fodder trees, etc.),
- * look for a source of financial credit for the new deer breeders,
- * establish and implement a marketing strategy,
- * carry out an education programme,
- * take over the various activities of the project, once completed.

6. FINANCIAL ASPECTS

Table 7 : Estimated budget (in French Francs)

YEAR	1	2	3
1. PERSONNEL			
. Local staff :			
1 senior @ 600,000 Dong/month	3.600	3.600	3.600
1 junior @ 500,000 Dong/month	3.000	3.000	3.000
15 Extensionists @ 40,000 Dong/m/E.	36.000	36.000	36.000
Driver and secretary	6.000	6.000	6.000
. Training :			
In New Caledonia	80.000	80.000	
In service	15.000	10.000	
International workshop : p.m.			
. Technical assistance :			
Permanent expert	470.000	485.000	
Temporary missions	82.000	84.500	87.000
2. EQUIPMENT			
. Vehicles :			
2 cars @140 000/car	280.000		
16 motorcycles @10 000 FF/motor.	160.000		
. Technical :			
Laboratory equipment	35.000		
Computer	20.000		
Scales	10.000		
Mobile crush	15.000		
House furniture	20.000		
Office equipment	20.000		
Miscellaneous	10.000		
3. RUNNING COSTS			
. Vehicles :			
Maintenance	7.000	14.000	14.000
Fuel	20.000	20.000	10.000
. Drug supplies	6.000	6.000	6.000
. Lab. supplies	6.000	6.000	6.000
. Analysis in France	10.000	10.000	10.000
. Local expertise	5.000	5.000	5.000
. Experimental costs	30.000	25.000	20.000
. House rentals	40.000	40.000	40.000
. Office rentals	20.000	20.000	20.000
. Contingencies	7.000	7.000	7.000
4. MANAGEMENT			
15% total except techn.assistance	129.690	43.740	27.990
Total per year (FF)	1.546.290	904.840	301.590
TOTAL (FF)		2.752.720	

7. EXPECTED RESULTS

7.1. Socio-economic impact

7.1.1. Local and Provincial level

Technical improvements due to the project are expected to increase the recruitment rate of the herd (Table 8). After 3 years the accelerated deer demography may add another 4,300 deer to the actual increase's speed (19,500 deer instead of 15,200). This augmentation would allow another 8,600 people to have access to deer ownership (39,000 instead of 30,400). Given the average family size, another 43,000 people would benefit from the project (195,000 instead of 152,000).

Table 8 : Probable socio-economic impact of the project (based on theoretical assumptions.

	Number of deer	Number of farms	Number of owners	Number of people concerned
Theoretical assumptions		2 deer per farm	2 owners per deer	5 people per family
Current situation	10,000	5,000	20,000	100,000
Without project : probable current increase (15%/year):				
1st.year	11,500	5,750	23,000	115,000
2nd.year	13,225	6,613	26,450	132,250
3d.year	15,209	7,604	30,418	152,090
With project : expected prospect (+5%increase/year):				
1st.year (20%)	12,000	6,000	24,000	120,000
2nd.year (25%)	15,000	7,500	30,000	150,000
3d.year (30%)	19,500	9,750	39,000	195,000

The marketing of alive animals would also be boosted by the project. Just like the velvet production, it would be nearly doubled in three years and bring substantial revenue increases to the farmers.

The surplus of cash income earned from the increased production

will allow farmers to invest in modern agricultural tools and buy agricultural inputs, thus to increase their agricultural production for their own benefit and the one of the country.

7.1.2. National level

The actual demography of the herd may increase the velvet production by 1.5 in 3 years, while the project may nearly double the same production in the same time (1.3 improvement in terms of volume). A similar figure may be expected for the body extract.

The value of velvet and body extract would follow the same pattern or may even increase due to both improved technology and better marketing.

It is expected that :

- * the local production will meet the local demand and save currencies by avoiding imports,
- * some extra quality products may be exported and earn foreign currencies.

There are also some export markets for alive sika deer in South East Asia, especially China. More remote countries would be interested if the sanitary status of the herd is proved to be clean.

The project will have to boost the dynamism of the "Deer Producers Association", helping the farmers to develop themselves. The project will succeed if, at the end, the farmers are able to go on their own.

7.2. Technical and scientific impact

The project is expected to remove the numerous constraints met by the deer industry at the present stage :

* Technical constraints : in the fields of reproduction, feeding, health, husbandry technology, supply of animals, etc.

* Scientific constraints : lack of expertise, specific research to respond to the questions asked by the farmers.

* Education constraints : lack of farmers information in deer matters, of extensionists specific formation, veterinarians and agronomists specialization.

* Organization constraints : at the producers level, lack of organization to look for financial supplies to the new coming farmers, to establish effective cooperative stores, to market the products, to educate the farmers, etc.

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9. GLOSSARY

Some of the technical words which are used in the text are explained below (Table 9) for the non-specialized readers. The acronyms are also explained in the same list. The terms which may be used for describing the different classes of animals are given in table 10.

Table 9 : Glossary.

Anglais	Français	Meaning
antler	bois	bone production on the head of male Cervids
antler casting	perte des bois	natural annual shedding of the antlers set
Axis deer	cerf axis	<i>Axis axis</i>
Barking deer	cerf muntjak	<i>Muntiacus muntjak</i>
Brow-antlered deer	cerf d'Eld	<i>Cervus eldi</i>
buttons	boutons	hard remains of velvetted antlers
Chital	chital	see Axis deer
CIRAD	CIRAD	Centre de Coopération Internationale en Recherche Agronomique pour le Développement
CITES	CITES	Convention on the Trade of Endangered Species, or Washington Convention
Dông	Dông	Vietnam currency ; approximate rate : 1 US\$ = 10,000 Dông 1 FF = 2,000 Dông
Eld's deer	cerf d'Eld	see Brow-antlered deer
EMVT	EMVT	Département d'Elevage et de Médecine Vétérinaire Tropicale (Department of CIRAD for animal husbandry and tropical veterinary medicine)
ERPA	ERPA	Etablissement de Régulation des Prix Agricoles, New Caledonia
fawn	faon	newly-born deer, usually until 6 months of age
Fallow deer	daim	<i>Dama dama</i>
heart water	cowdriose	rickettsiosis due to <i>Cowdria ruminantium</i>
hind	biche	female deer after its first mating
Hog deer	cerf cochon	<i>Axis porcinus</i>
IUCN	UICN	International Union for the Conservation of Nature
Muntjak	cerf muntjak	see Barking deer
Musk deer	cerf porte-musc	<i>Moschus moschiferus</i>

MCF	coryza gan-gréneux	Malignant Catarrhal Fever
Para	cerf cochon	see Hog deer
Red deer	cerf d'Europe	<i>Cervus elaphus</i>
Reindeer	renne	<i>Rangifer tarandus</i>
Rusa deer	cerf rusa	<i>Cervus timorensis</i>
rut or rutting season	rut ou brâme	breeding season
Sambar deer	cerf sambar	<i>Cervus unicolor</i>
Sika deer	cerf sika	<i>Cervus nippon</i>
spiker	daguet	one year-old male
stag	cerf mâle	adult deer male, usually above 2 years-old
tahil	tahil	1 tahil = 37.5 g (Chinese weight measure)
Tb	tuberculose	tuberculosis
Timorensis deer	cerf rusa	see Rusa deer
velvet or velvet antler	velours ou bois en velours	growing antler
velvetting	coupe des velours	annual velvet cropping
venison	venaison	meat of wild animals in general, of deer especially
Wapiti	wapiti	<i>Cervus elaphus canadensis</i> (Amérique) and <i>C.e.xanthopygus</i> (Asie)
Young hind	bichette	female deer between 6 months-old and first mating

Table 10 : Technical terms for describing the different classes of animals.

Sika deer	Male		Female		Young	Birth
	adult	one-year	adult	one-year		
English	stag	spiker	hind	young hind	fawn	fawning
French	cerf	daguet	biche	bichette	faon	naissance

10. APPENDICES

10.1. "Some introduction about the development of spotted deer (Sika deer) in Nghe An, Ha Tinh provinces" by Prof.Dr.LE VIET LY (*in extenso*).

Ha Tinh, Nghe An are two provinces in the central part of Vietnam which are located in 18th-20th parallel. These provinces have border with Laos by Truong Son range, and connect with the sea in the East. The annual rainfall is about 1800 mm. There is hot west wind from Laos it makes dry in summer. Trees are green all round the year. Plenty of fodder trees are available in the region.

Spotted deer (*Cervus nippon terminck*), or often called Sika deer, has been reared for nearly 100 years. Wild deer were hunted by the hunters and brought home to rear for producing velvet, which is considered as the valuable tonic for people. The value of velvet was recognized for a long time in Vietnam and surrounding countries. traditional deer production developed itself in some families in the districts of Huong Son, Huong Khe, Duc Tho (Ha Tinh), Thanh Chuong, Quynh Luu, Tan Ki (Nghe An). Thanh Chuong and Huong Son are nearby districts although these two districts belong to two different provinces. The deer breeding farm is located in Tay Son commune, Huong Son district where is the semi-mountainous area. The "Dua" mountain is located in this place that is on the triple cross of the river where in the past the wild deer used to come to drink water. The deer breeding farm Huong Son comprising of 3 areas and was built in 1969. The total number of deer here is 300 heads of which 200 are breeding male and female deer. The young breeding deer are produced for sale. In the Huong Son area there are 4 communes having the deer strength of 4,000 heads in total. They are Son Giang, Son Trung, Son Chau and Son Ninh. Farmers in this area have good experiences in deer reproduction and together with Huong Son Deer Breeding Farm they supply breeding stocks to outside. Velvet is produced and consumed by different ways.

The total number of deer in Nghe An and Ha Tinh provinces is about 10,000 heads, with a greater herd in Nghe An. The deer production developed very quickly in Quynh Luu district. In Quynh Luu deer are reared in holdhouse farms. Three communes have the strength of 500 to 750 heads. The biggest number is in Quynh Xuan commune (750 heads), then in Quynh Bang (600-650 heads) and in Quynh Luong (500 heads). Four communes have the strength of 300-450 heads : Quynh Tien (450), then Quynh My, Quynh Lien and Quynh Van. The other communes in the district (25 communes) have a deer strength under 300 heads. There are about 200 spotted deer in Vinh Cit, Nam Dan, Dien Chau, Yen Thanh districts, 100-200 heads in Quy Hop, Do Luong, Nghia dan, Tan Ki districts. In the remaining districts there are about 50-70 heads.

Spotted deer is considered as a precious animal gene in Nghe An and Ha Tinh. The demand for breeding stock is very high and the price is quite expensive.

Although deer are raised as livestock, they still keep several wild characteristics. For that farmers have to build steady shed to avoid them running away. Wild deer like to eat some specific fodder trees of which the melia tree (Bead tree) is not eaten by other animals.

There is still very little initial knowledge on deer. There is a shortage of knowledge and scientific papers about deer raising in Vietnam now. The traditional experience is requested to be combined with science and advanced techniques to contribute to the development of the deer production in the region.

The problems presented bellow need to be concerned :

1. The improvement of deer breeding.
2. relation between habit and management.
3. Improvement of reproduction.
4. Study of the digestibility physiology, feeding management and utilization of food.
5. diseases control. The reproductive diseases and diseases in young deer.
6. Deer processing and products marketing.

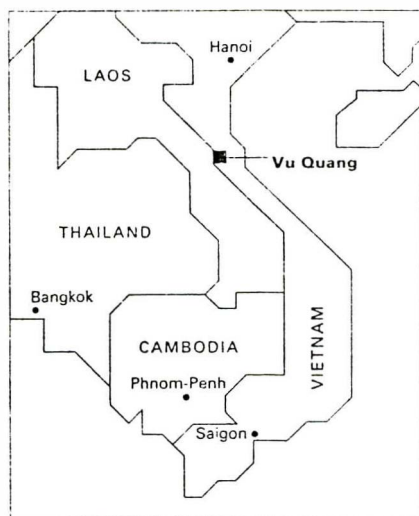
The Unknown Bovid

Ecologically recovering Vietnam seems to harbour a multitude of yet-to-be identified animals

You may soon be adding a new name to your animal vocabulary. In May, during a joint WWF/Ministry of Forestry survey of Northern Vietnam's Vu Quang Nature Reserve, a team led by Dr Vu Vau Dung of the Forest Inventory and Planning Institute (FIPI) and WWF's Dr John MacKinnon found three sets of upper skull and horns that they had never seen before.

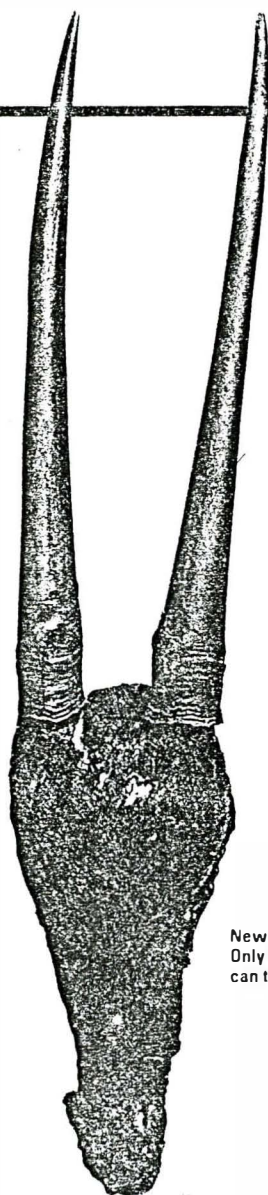
A specimen of skin and hair will be sent to the US for DNA comparisons with other bovids. If the results reveal a new species, it will be the first large mammal discovery since 1936, when Dr R. Sauvel found the kouprey, another bovid, in Cambodia.

"We still don't know exactly what it is," explains MacKinnon. "It is cer-



tainly a bovid – belonging to the same family as sheep and cattle. The local people call it a forest goat but the horns are unlike other goats or goat antelopes. They look more like those of the Sulawesi anoa, a dwarf buffalo. Like the anoa, the new bovid seems to be a lowland forest animal. It is a rich brown to black colour with 80-centimetre-long horns. We're very excited. New large mammal finds are rare, with only a handful in the last 100 years."

Previous surveys had bypassed Vu Quang, on the Laos border in Ha



New species?
Only its geneticist
can tell.

WWF/JOHN MAC KINNON

Tinh province, but it has turned out to be a natural treasure trove. "The area was somehow spared war damage and is a bit like a lost world, geographically cut off from the rest of Indochina," says MacKinnon. "Not only does it have relic populations of rare and endemic species but some species that are common and well distributed in the rest of Vietnam seem to be strangely absent."

Over three weeks, the team of six scientists, two local foresters, and six soldiers also believe they have found what appear to be new species of fish, tortoise, and sunbird.

Spurred by the survey report, the local government and the Ministry of Forestry have agreed to terminate plans for further logging in the area and will enlarge the nature reserve. The next step: to encourage the Laos government to establish an adjacent protected area on its side of the border.

WWF Wins Panda Suit

BY CHING SOH KOON

After months of legal wrangling over a controversial panda loan, WWF-US reached a victory settlement for panda conservation with Ohio's Columbus Zoo in June.

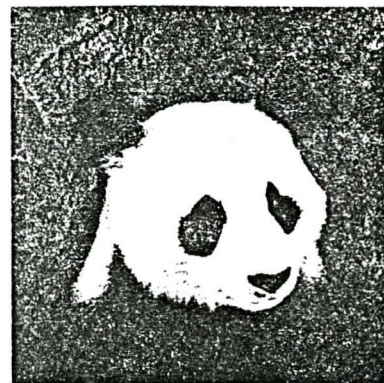
Having already agreed to donate US\$300,000 to Chinese panda conservation programmes, the zoo will now give an additional 65 per cent of net revenues from its panda exhibition, which ends in October.

The zoo will also donate US\$65,000 to WWF-US, which will use the money to cover legal fees incurred from the US\$1million lawsuit the zoo filed against WWF-US in April.

The suit arose when WWF-US opposed the zoo renting two giant pandas from China. WWF-US believes loans undermine efforts to save one of the world's most endangered animals by

cutting down the gene pool for captive breeding programmes.

WWF-US agreed to the settlement only after the US Fish and Wildlife Service formally announced to the Secretary General of the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) that it would review its panda import policy. Columbus Zoo is not extending its panda show as originally planned.



WWF/KOJO TANAKA



CERFS 1992

**la
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en
Asie du Sud-Est**

CIRAD-EMVT

centre de coopération internationale
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ERPA

établissement de régulation des prix agricoles

EDEC

établissement d'élevage de cervidés
de Nouvelle-Calédonie

OCEF

office de commercialisation et d'entreposage
frigorifique

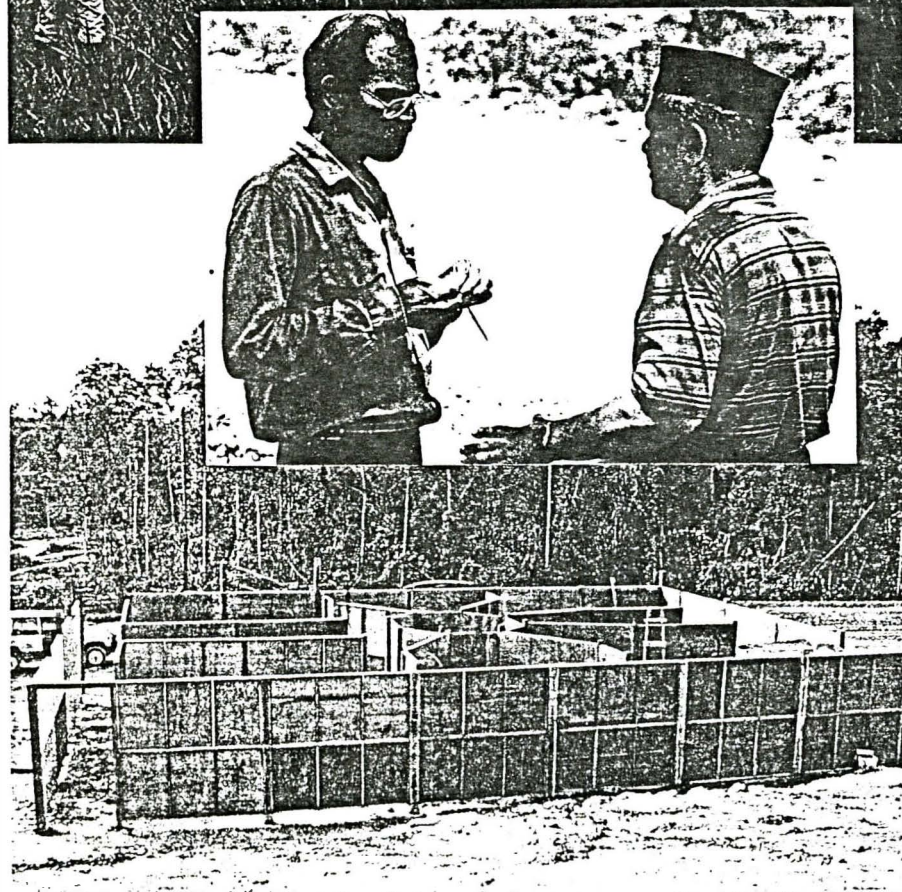
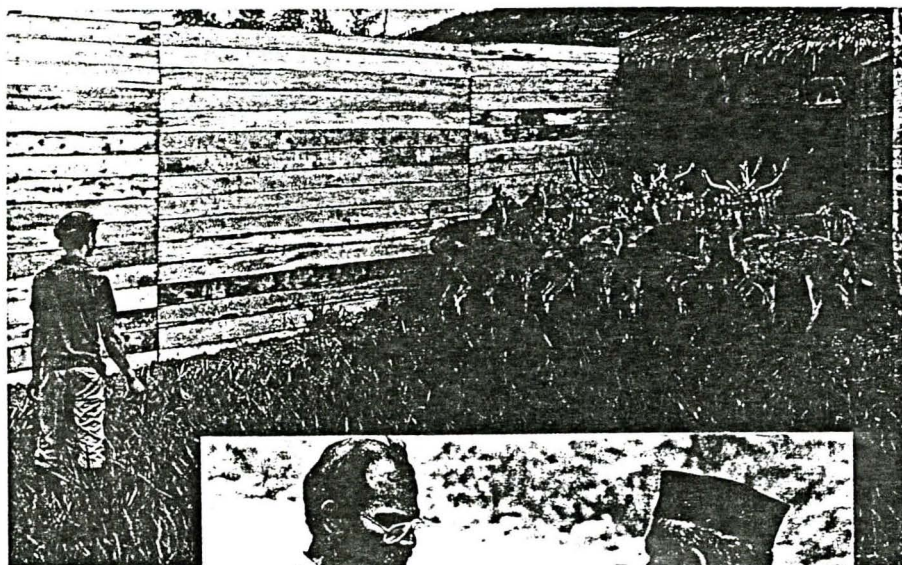
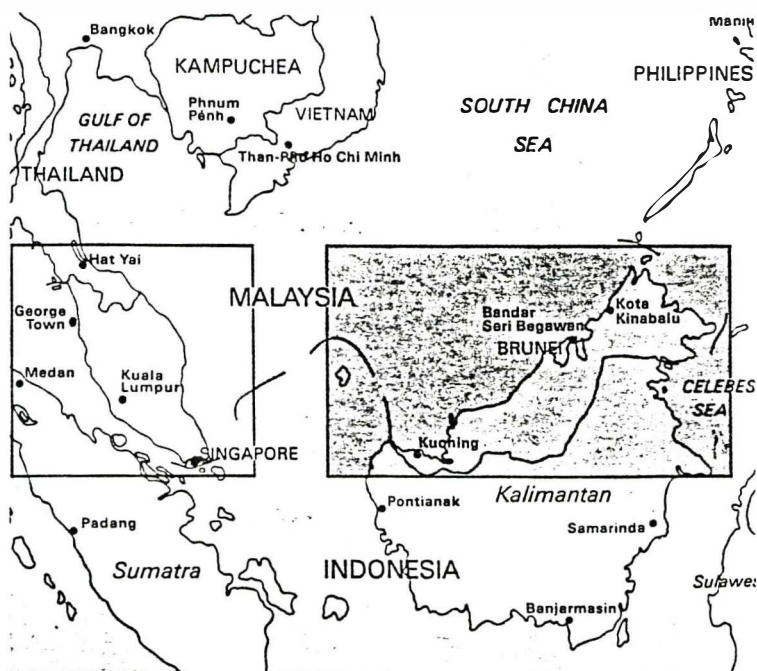
M A L A I S I E

EXPORTATION DE CERFS RUSA
750 animaux exportés en 1992
par les éleveurs calédoniens

DEVELOPPEMENT
création de nouvelles fermes
amélioration de fermes existantes

RECHERCHE
protection de la santé animale
amélioration de l'alimentation

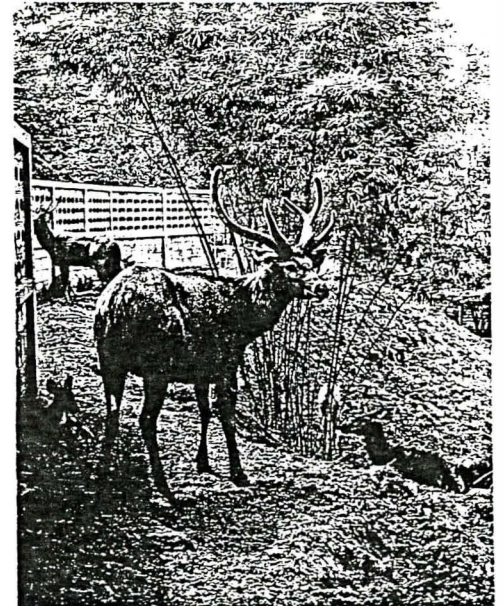
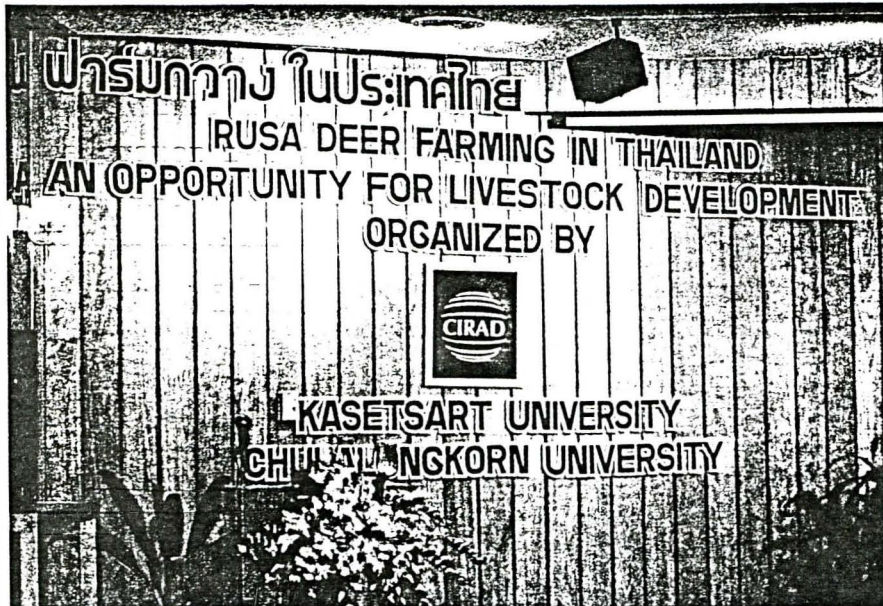
FORMATION
transfert de technologie
coopération avec les services
vétérinaires malaisiens



T H A I L A N D E

PROMOTION DE LA TECHNOLOGIE CALEDONIENNE
EN ELEVAGE DE CERFS RUSA

ETUDE DE FAISABILITE D'UN CENTRE DE RECHERCHE
SUR L'ELEVAGE DE CERFS TROPICAUX

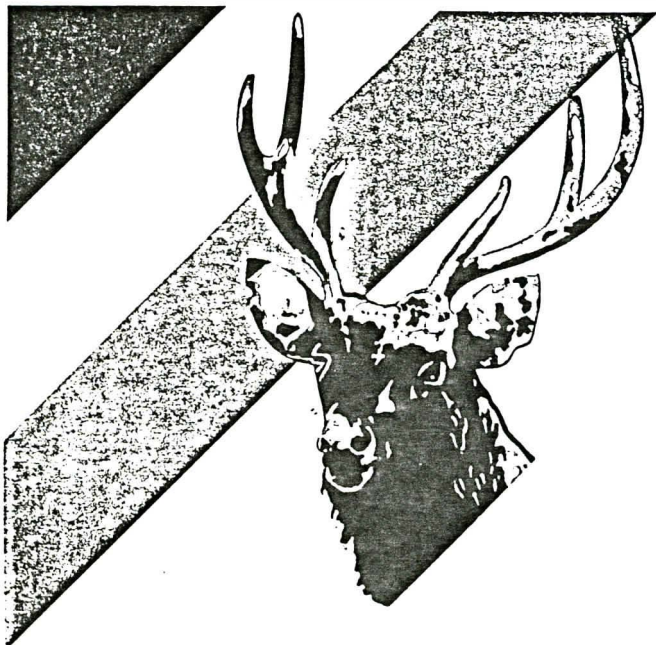
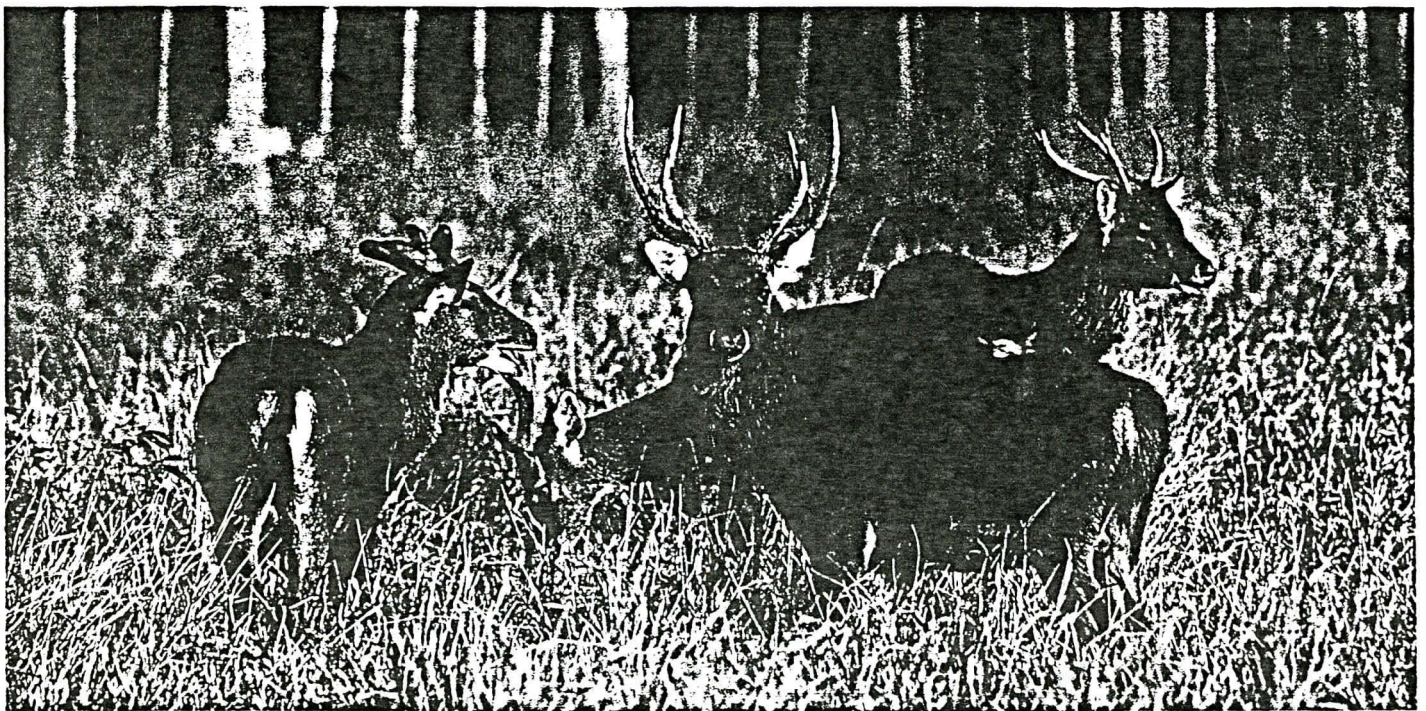
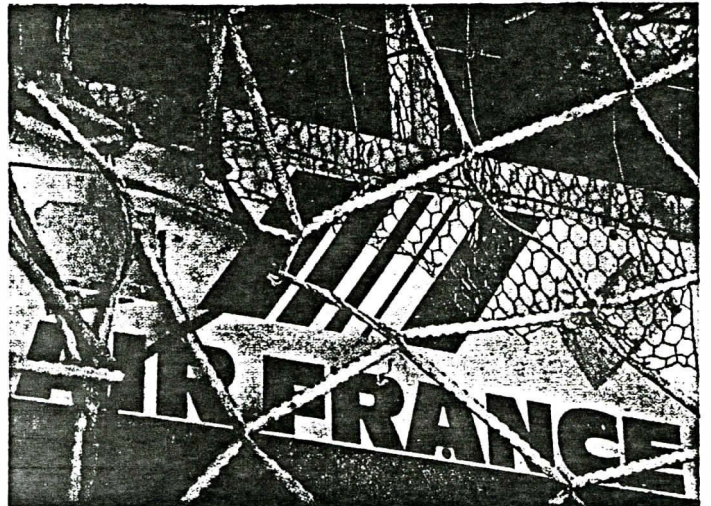


V I E T N A M

PREPARATION D'UN PROJET DE DEVELOPPEMENT RURAL
AUTOUR DE L'ELEVAGE TRADITIONNEL DE CERFS
DANS LA PROVINCE DE NGHE AN



Nouvelle Calédonie



cerf RUSA deer

Deer Farming in the Tropics

Deer farming is a means of diversifying livestock production. In certain countries, it is also a way of developing marginal areas that are not suitable for cattle.

The Javanese Rusa Deer (*Cervus Timmorensis russa*)

The Javanese Rusa deer was introduced in numerous tropical countries because of its adaptability. As it is extremely gregarious and polygamous, it can be easily integrated in an intensive system.

The Rusa deer is a mixed feeder (grazer and browser), and can easily adapt itself to a wide range of environments.

High Production Potential

Deer farming for meat (venison), velvet (antlers), hide and other by-products is a means



of diversifying income from livestock production.

Successful Promotion of Deer Farming in New Caledonia

Javanese deer were introduced in New Caledonia in 1870; they are now prized for their meat.

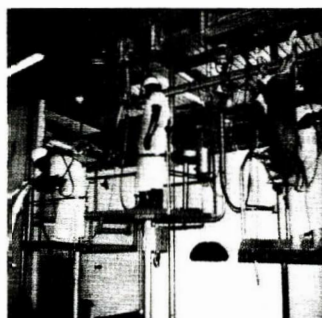
A Deer Operation was launched in 1987 with support from CIRAD-EMVT. There are now around twenty farmers with 20,000 head of deer. Products are processed in EEC-approved installations, and mainly marketed overseas.

CIRAD has set up a centre for research, on reproduction, feeding and nutrition, pasture management and agroforestry, animal health, and meat quality. The results are used for productivity estimates and implementing breeding schemes.

Current Projects

In Réunion, work is carried out on deer pastures, health, and productivity assessment.

CIRAD-EMVT has also supported the development of other deer species, such as Sambar or Axis in Malaysia. It was involved in assisting new farmers and in animal health projects.



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développement

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